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Saló d'Actes "Charles Darwin". Campus de Burjassot

El Premi Nobel de Química 2014: Combinant Òptica i Química per a fer visible l'indistingible

The Nobel Prize 2014 in Chemistry

Their microscopes crossed the threshold

Optical microscopy had long been hindered by a presumed limitation: that it was impossible to achieve a resolution better than half the wavelength of light. Eric Betzig, Stefan W. Hell and William E. Moerner are awarded the 2014 Nobel Prize in Chemistry for ingeniously bypassing this limitation. Their revolutionary work has taken optical microscopy to nano dimensions.

2014 - Betzig develops single-molecule microscopy

2014 - Hell develops STED microscopy

1897 - Moerner lays the foundation for single-molecule microscopy

2014 - Betzig develops single-molecule microscopy

In 2006, Eric Betzig conceived a bold idea: to use a single spot of light to illuminate a single molecule at a time. Because he had never realized the difference between these two concepts, they remained in his mind for several years. Betzig then turned to a new subfield of optics, and he was able to do it. The concept was repeated and refined in the years that followed.

2014 - Hell develops STED microscopy

Stefan Hell's idea was to use two colors of light to excite and deactivate a molecule at the same time. He used a green laser to excite a molecule and a red laser to deactivate it. This allowed him to see individual molecules in a sample.

1897 - Moerner lays the foundation for single-molecule microscopy

Single-molecule microscopy really got its start in 1989, when the first single-molecule fluorescence experiment was performed. This was done by Martin A. Leigh and his colleagues at the University of California, Berkeley. They used a technique called "single-molecule fluorescence spectroscopy" to study the behavior of individual molecules.

The principle of STED microscopy

1. Regular optical microscopy

2. STED microscopy

3. Super-resolved microscopy

Eric Betzig
U.S. citizen, born in 1964, in New York, NY, USA. Group Leader at Cornell University, Ithaca, NY, USA.

Stefan W. Hell
German citizen, born 1967 in Gießen, Germany. Director at Max Planck Society, Jülich, Germany. Professor at RWTH Aachen University, Aachen, Germany.

William E. Moerner
U.S. citizen, born 1943 in Berkeley, CA, USA. Henry S. Gantt Professor of Chemistry at Stanford University, Stanford, CA, USA.

FURTHER READING:

• [Nobel Prize 2014 in Chemistry](#)

• [STED microscopy](#)

• [Single-molecule microscopy](#)

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